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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

SPIEGLER, ALEXANDER H

ART UNIT	PAPER NUMBER
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1637

DATE MAILED: 05/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/889,326

Applicant(s)

HARTWICH, GERHARD

Examiner

Alexander H. Spiegler

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 127-197 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 127-197 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 14, 2004 has been entered.

Status of the Application

2. Claims 127-197 are pending. This action is made NON-FINAL. Any objections and rejections not reiterated below are hereby withdrawn. Specifically, the previous rejections in view of Meade et al. have been withdrawn. The Examiner has changed for this application.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 134-135 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 134-135 are indefinite over “reaction center of photosynthesizing organisms” and “reaction center of photosynthesizing bacteria” because it is not clear as to what in the reaction center (RC) of photosynthesizing organisms or bacteria is considered to be the redox-moiety. That is, it is not clear as to what structure or part of the RC is considered to be the donor and acceptor of the redox-moiety.

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Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 127-133 and 136-197 are rejected under 35 U.S.C. 102(e) as being anticipated by Bamdad et al. (USPN 6,541,617).

Regarding Claims 127 and 154-162, Bamdad et al. teaches a modified nucleic acid oligomer and a method of making said oligomer comprising a nucleic acid oligomer attached to a single redox-active moiety, wherein the redox-active moiety comprises at least one electron-donor molecule and at least one electron-acceptor molecule, the at least one electron-donor molecule and the at least one electron-acceptor molecule not being joined by a nucleic acid oligomer. (See Figures 1 and 3-5, col. 5, 12-14, 20, 34-36, 41-42, 44-46, 52-56, and 61)

Regarding Claims 128-129, Bamdad teaches the modified nucleic acid oligomer according to claim 127, wherein the redox-active moiety comprises at least one redox-active moiety, linked, to at least one bimolecular electron-donor/electron-acceptor complex, at least one electron-donor molecule of the redox-active moiety and at least one electron-acceptor molecule of the redox-active moiety being joined with one another via one or more bonds (e.g., covalent bonds). (See Figures 1 and 3-5, col. 5, 12-14, 20, 34-36, 41-42, 44-46, 52-56, and 61)

Regarding Claims 130-133, Bamdad teaches the modified nucleic acid oligomer according to claim 127, wherein the redox-active moiety comprises at least one redox-

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active moiety, linked, to at least one bimolecular electron-donor/electron-acceptor complex, at least one electron-donor molecule of the redox-active moiety and at least one electron-acceptor molecule of the redox-active moiety being covalently joined via one or more branched or linear molecular moieties of any composition and chain length (e.g., 1-14 atoms) and the redox-moiety additionally comprises one or more macromolecules. (See Figures 1 and 3-5, col. 5, 12-14, 20, 34-36, 41-42, 44-46, 52-56, and 61)

Regarding Claims 136-139, Bamdad teaches the modified nucleic acid oligomer according to claim 127, wherein at least one of the electron-donor molecules and electron-acceptor molecules is a pigment, such as a flavin, a (metallo)porphyrin, a (metallo)chlorophyll, a (metallo)bacteriochlorophyll, or a derivative of these pigments, or wherein at least one of the electron-donor molecules and electron-acceptor molecules is a nicotinamide or a quinone (e.g., a pyrroloquinoline quinone (PQQ), a 1,2-benzoquinone, a 1,4-benzoquinone, a 1,2-naphthoquinone, a 1,4-naphthoquinone, a 9,10-anthraquinone, or one of their derivatives. (See cols. 41-42, for example)

Regarding Claims 140-142, Bamdad teaches the modified nucleic acid oligomer according to claim 127, wherein at least one of the electron-donor molecules and electron-acceptor molecules is a charge transfer complex, such as a transition metal complex of Ru(II), Cr(III), Fe(II), Os(II), or Co(II). (See col. 42, for example).

Regarding Claims 143-144, Bamdad teaches the modified nucleic acid oligomer according to claim 127, wherein the modified nucleic acid oligomer can sequence-

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specifically bind single-strand DNA, RNA, and/or PNA, and wherein the modified nucleic acid oligomer is a deoxyribonucleic acid oligomer, a ribonucleic acid oligomer, or a peptide nucleic acid oligomer. (See col. 6-8 and 11-13, for example).

Regarding Claims 145-150, Bamdad teaches the nucleic acid oligomer according to claim 127, wherein the redox-active moiety is covalently bound to one of the phosphoric-acid groups, to one of the carboxylic-acid groups, to one of the amine groups, or to a sugar of the nucleic acid oligomer backbone, or wherein the redox-active moiety is covalently attached to a thiol group, a hydroxyl group, a carboxylic-acid group, or an amine group of a modified base of the nucleic acid oligomer, or wherein the reactive thiol, hydroxyl, carboxylic-acid, or amine group of the base is covalently bound to the base via a branched or linear molecular moiety of any composition and chain length, the shortest continuous link between the thiol, hydroxyl, carboxylic-acid, or amine group and the base being a branched or linear molecular moiety having a chain length of 1-14 atoms, or wherein the redox-active moiety is attached to an end of the nucleic acid oligomer backbone or to a terminal modified base. (See Figures 1 and 3-5, col. 6-7, 12-16, 20, 23, 32-38, 41-42, 44-46, 50, 52 and 61)

Regarding Claims 151-153, Bamdad teaches the modified nucleic acid oligomer according to claim 127, wherein the redox-active moiety is photoinducibly redox-active moiety, or a chemically-inducibly redox-active moiety, and wherein multiple redox-active moieties are attached to the nucleic acid oligomer. (See Figures 1 and 3-5, and cols. 41-44, for example).

Regarding Claims 163-170, Bamdad teaches a modified conductive surface, comprising at least one type of modified nucleic acid oligomer according to claim 127 attached to

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a conductive surface, wherein the surface is a metal or a metal alloy, wherein the surface is a metal selected from platinum, palladium, gold, cadmium, mercury, nickel, zinc, carbon, silver, copper, iron, lead, aluminum and manganese, semiconductor materials, etc.. (See col. 9, for example).

Regarding Claims 171-183, Bamdad teaches the various methods of attaching the nucleic acid oligomer to the conductive surface and the various modified conductive surfaces required by the claims. (See cols. 9-16 and 23-26, for example).

Regarding Claims 184-187, Bamdad teaches methods of producing the modified conductive surface. (See Figures 4-5 and cols. 9-13, 22-25 and 39-40, for example)

Regarding Claims 188-197, Bamdad teaches method of electrochemically detecting hybridization events. (See cols. 57-67, for example)

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 134-135 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bamdad et al. (USPN 6,541,617), as applied to Claims 127-133 and 136-197, in view of Haberle et al. (Laser in Forschung und Technik Vortaege des Internationalen Kongresses; 12th, Munich, June 1995: 179-184).

The teachings of Bamdad are presented above. Bamdad teaches a modified nucleic acid

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oligomer comprising a nucleic acid oligomer attached to a single redox-active moiety, wherein the redox-active moiety comprises at least one electron-donor molecule and at least one electron-acceptor molecule, the at least one electron-donor molecule and the at least one electron-acceptor molecule not being joined by a nucleic acid oligomer. Bamdad does not teach the redox-moiety comprising the reaction center of photosynthesizing bacteria.

However, Haberle teaches the “ultrafast electron transfer in modified photosynthetic reaction centers from *Rhodobacter sphaeroides*” (see title and abstract). That is, Haberle teaches the electron transfer that occurs within a redox-moiety comprising the reaction center of photosynthesizing bacteria proceeds at an “ultrafast” rate.

Accordingly, in view of the teachings of Haberle, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Bamdad so as to have used a redox-moiety comprising the reaction center of photosynthesizing bacteria. One of ordinary skill in the art would have been motivated to modify the method of Bamdad in order to have achieved the benefit of providing a more efficient electron transfer reaction by utilizing the “ultrafast” means of electron transfer that occurs within a redox-moiety comprising the reaction center of photosynthesizing bacteria.

Conclusion

9. No Claims are allowable.
10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Barton et al. (USPN 6,221,586), Kayyem et al. (USPN 6,096,273), Batz et al. (USPN 6,225,052), Lee et al. (USPN 6,432,641).

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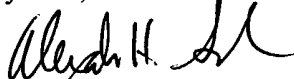
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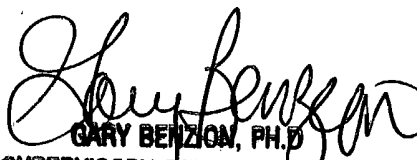
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander H. Spiegler whose telephone number is (571) 272-0788. The examiner can normally be reached on Monday through Friday, 7:00 AM to 3:30 PM.

If attempts to reach the examiner are unsuccessful, the examiner's supervisor, Gary Benzion can be reached at (571) 272-0782.

Papers related to this application may be faxed to Group 1637 via the PTO Fax Center using the fax number (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Alexander H. Spiegler
May 12, 2004


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5/13/04